Dell PowerConnect W-AirWave 7.3

Best Practices Guide

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This preface provides an overview of this best practices guide and contact information for Dell, and includes the following sections:

- "Document Organization" on page 5
- "Note, Caution, and Warning Icons" on page 6
- "Contacting Support" on page 6

Document Organization

This best practices guide includes instructions and examples of optimal ways to use and integrate the AirWave Management Platform (AMP) with Dell PowerConnect W-Series devices and infrastructure.

Table 1 *Document Organization and Purposes*

Chapter	Description
Chapter 1, "Overview" on page 7	This chapter explains the minimum requirements, prerequisites, topology of an Dell PowerConnect W-Series infrastructure integrated with AMP.
Chapter 2, "Configuring AirWave for Global Dell PowerConnect W-Series Infrastructure" on page 9	This chapter explains global configuration options in AMP.
Chapter 3, "Configuring a Dell PowerConnect W Group in AMP" on page 13	This chapter explains how to create and monitor an Dell PowerConnect W group in AMP.
Chapter 4, "Discovering Dell PowerConnect W-Series Infrastructure" on page 15	This chapter explains how to discover and manage your Dell PowerConnect W-Series infrastructure.
Chapter 5, "AMP and Dell PowerConnect W-Series Integration Strategies" on page 19	This chapter highlights recommended integration strategies.
Chapter 6, "Dell PowerConnect W-Specific Capabilities in AMP" on page 29	This chapter highlights AMP capabilities that are specific to Dell PowerConnect W-Series devices.
Appendix A, "CLI ArubaOS & AMP Commands" on page 37	This appendix explains command line interface (CLI) commands.
Appendix B, "How AMP Acquires Data from Dell PowerConnect W-Series devices" on page 41	This appendix provides a table that explains how AMP acquires data from Dell PowerConnect W-Series devices.
Appendix C, "WMS Offload Details" on page 43	This appendix explains WMS Offload in further detail.
Appendix D, "Increasing Location Accuracy" on page 45	This appendix explains ways to increase location accuracy in AMP.

Note, Caution, and Warning Icons

This document uses the following note, caution, and warning icons to emphasize advisories for certain actions, configurations, or concepts:

NOTE: Indicates helpful suggestions, pertinent information, and important things to remember.

CAUTION: Indicates a risk of damage to your hardware or loss of data.

WARNING: Indicates a risk of personal injury or death.

Contacting Support

Table 2 *Website contact*

Web Site	
Main Website	dell.com
Support Website	support.dell.com
Documentation Website	support.dell.com/manuals

Chapter 1

Overview

This document provides best practices for leveraging Dell PowerConnect W-AirWave (AMP, Master Console and Failover) to monitor and manage your Dell PowerConnect W-Series infrastructure. Dell PowerConnect W-Series wireless infrastructure provides a wealth of functionality such as firewall, VPN, remote AP, IDS, IPS, and ARM, as well as an abundance of statistical information.

Follow the simple guidelines in this document to garner the full benefit of the Dell PowerConnect W-Series infrastructure.

This overview chapter contains the following topics:

- "Prerequisites for Integrating Dell PowerConnect W-Series Infrastructure" on page 7
- "Auth protocol" on page 7

NOTE: Dell PowerConnect W-Series AirWave Wireless Management Suite (AWMS), AirWave, and AirWave Management Platform (AMP) refer to the same product set and are used interchangeably.

Prerequisites for Integrating Dell PowerConnect W-Series Infrastructure

You will need the following information to monitor and manage your Dell PowerConnect W-Series infrastructure:

- SNMP community string (monitoring & discovery)
- Telnet/SSH credentials (configuration only)
- "enable" password (configuration only)

NOTE: Without proper Telnet/SSH credentials AMP will not be able to acquire license and serial information from controllers.

- SNMPv3 credentials are required for WMS Offload:
  - Username
  - Auth password
  - Privacy password
  - Auth protocol

Chapter 2

Configuring AirWave for Global Dell PowerConnect W-Series Infrastructure

This chapter explains how to optimally configure Dell PowerConnect W-AirWave to globally manage your Dell PowerConnect W-Series infrastructure, and contains the following topics:

- "Disabling Rate Limiting in AMP Setup > General" on page 9
- "Entering Credentials in Device Setup > Communication" on page 9
- "Setting Up Recommended Timeout and Retries" on page 10
- "Setting Up Time Synchronization" on page 11
- "Enabling Support for Channel Utilization & Statistics" on page 11

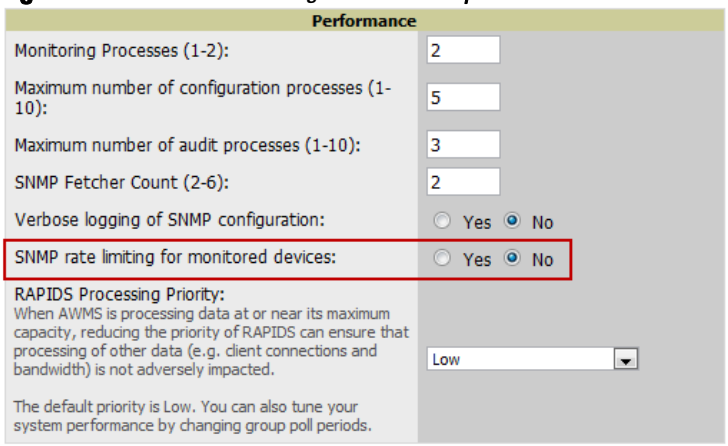
Disabling Rate Limiting in AMP Setup > General

In **AMP Setup > General**, the **SNMP Rate Limiting for Monitored Devices** option adds a small delay between each SNMP GET request, thus the actual polling intervals will be longer than what is configured. For example, setting a 10-minute polling interval will result in an actual 12-minute polling interval. Disabling rate limiting is recommended in most cases.

To disable rate limiting in AirWave, follow these steps:

1. Navigate to **AMP Setup > General**.
2. Locate the **Performance** section on this page.
3. In the **SNMP Rate Limiting for Monitored Devices** field, select **No**, as shown in Figure 1.
4. Select **Save**.

Figure 1 *SNMP Rate Limiting in* ***AMP Setup > General***


Performance
Monitoring Processes (1-2):
2
Maximum number of configuration processes (1-10):
5
Maximum number of audit processes (1-10):
3
SNMP Fetcher Count (2-6):
2
Verbose logging of SNMP configuration:
Yes
No
SNMP rate limiting for monitored devices:
Yes
No
RAPIDS Processing Priority:
When AWMS is processing data at or near its maximum capacity, reducing the priority of RAPIDS can ensure that processing of other data (e.g. client connections and bandwidth) is not adversely impacted.
Low
The default priority is Low. You can also tune your system performance by changing group poll periods.

Entering Credentials in Device Setup > Communication

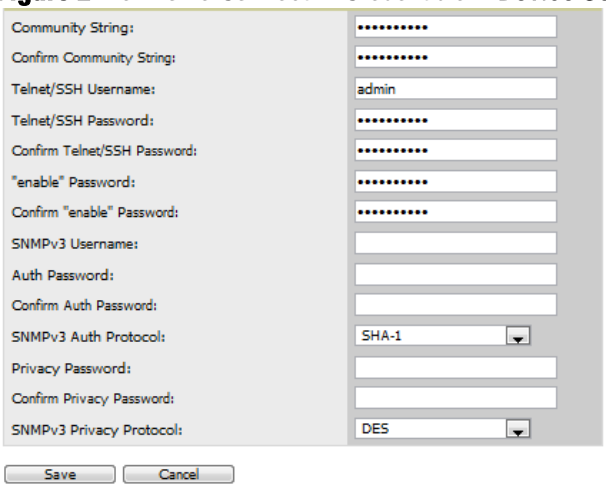
AMP requires several credentials to properly interface with Dell PowerConnect W-Series infrastructure. To enter these credentials, follow these steps:

1. Navigate to **Device Setup > Communication**.
2. In the **Default Credentials** section, select the **Edit** link next to **Dell PowerConnect W**. The page illustrated in Figure 2 appears.

3. Enter the **SNMP Community String**.

NOTE: Be sure to note the community string, because it must match the SNMP Trap community string which is configured later in this document.

Figure 2 *Dell PowerConnect W Credentials in* ***Device Setup > Communication***



4. Enter the required fields for configuration and basic monitoring:
   - Telnet/SSH Username
   - Telnet/SSH Password
   - "enable" Password
5. Enter the required fields for WMS Offload:
   - SNMPv3 Auth Protocol
   - SNMPv3 Privacy Protocol
   - SNMPv3 Username
   - Auth Password
   - Privacy Password

NOTE: The protocols should be SHA and DES in order for WMS Offload to work.

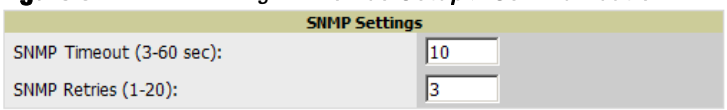
6. When finished, select **Save**.

Setting Up Recommended Timeout and Retries

To set recommended timeout and retries settings, follow these steps:

1. In the **Device Setup > Communication** page, locate the **SNMP Setting** section.
2. Change **SNMP Timeout** setting to **10**.
3. Change **SNMP Retries** to **1**.

Figure 3 *Timeout settings in* ***Device Setup > Communication***



4. Select **Save**.

Setting Up Time Synchronization

Setting up NTP on AirWave

On the **AMP Setup > Network** page, locate the **Network Time Protocol (NTP)** section. The Network Time Protocol is used to synchronize the time between AMP and your network reference NTP server. NTP servers synchronize with external reference time sources, such as satellites, radios, or modems.

NOTE: Specifying NTP servers is optional. NTP servers synchronize the time on the AMP server, not on individual access points.

To disable NTP services, clear both the **Primary** and **Secondary** NTP server fields. Any problem related to communication between AMP and the NTP servers creates an entry in the event log. For more information on ensuring that AMP servers have the correct time, please see http://support.ntp.org/bin/view/Servers/NTPPoolServers.

Table 3 *AMP Setup > Network > Secondary Network Fields and Default Values*

Setting	Default	Description
Primary	ntp1.yourdomain.com	Sets the IP address or DNS name for the primary NTP server.
Secondary	ntp2.yourdomain.com	Sets the IP address or DNS name for the secondary NTP server.

You can set the clock on a controller manually or by configuring the controller to use a Network Time Protocol (NTP) server to synchronize its system clock with a central time source.

Manually Setting the Clock on a Controller

You can use either the WebUI or CLI to manually set the time on the controller's clock.

1. Navigate to the **Configuration > Management > Clock** page.
2. Under **Controller Date/Time**, set the date and time for the clock.
3. Under **Time Zone**, enter the name of the time zone and the offset from Greenwich Mean Time (GMT).
4. To adjust the clock for daylight savings time, click **Enabled** under Summer Time. Additional fields appear that allow you to set the offset from UTC, and the start and end recurrences.
5. Click **Apply**.

Enabling Support for Channel Utilization & Statistics

In order to enable support for channel utilization statistics, you must have the following:

- Dell PowerConnect W-AirWave 7.2 or later
- ArubaOS 6.0.1 or later

NOTE: AOS 6.0.1 can report RF utilization metrics, while AOS 6.1 is necessary to also obtain classified interferer information.

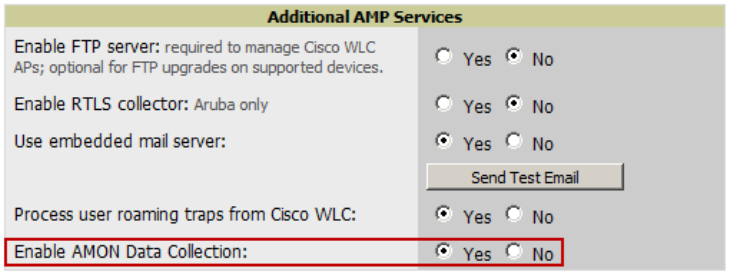
- Access points - Dell PowerConnect W-AP105, Dell PowerConnect W-AP92, Dell PowerConnect W-AP93, Dell PowerConnect W-AP125, Dell PowerConnect W-AP124, Dell PowerConnect W-AP134
- Controllers - Dell PowerConnect W-Series 6xx, 3xxx, or 6000

AirWave Setup

Follow these steps in AMP:

1. Navigate to **AMP Setup > General.**
2. In the **Additional AMP Services** section, set **Enable AMON Data Collection** to **Yes**, as shown in Figure 4:

Figure 4 *AMON Data Collection setting in* ***AMP Setup > General***


Additional AMP Services
Enable FTP server: required to manage Cisco WLC APs; optional for FTP upgrades on supported devices.
Yes No
Enable RTLS collector: Aruba only
Yes No
Use embedded mail server:
Yes No
Send Test Email
Process user roaming traps from Cisco WLC:
Yes No
Enable AMON Data Collection:
Yes No

3. Select **Save**.

Controller Setup (Master & Local)

CAUTION: Enabling these commands on AOS versions prior to 6.0.1.0 can result in performance issues on the controller. If you are running previous firmware versions such as AOS 6.0.0.0, you should upgrade to AOS 6.0.1 (to obtain RF utilization metrics) or 6.1 (to obtain RF utilization *and* classified interferer information) before you enter this command.

SSH into the controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
(Controller-Name) (config) # mgmt-server type amp primary-server <AMP IP>
(Controller-Name) (config) # write mem
```

Chapter 3

Configuring a Dell PowerConnect W Group in AMP

It is prudent to establish a Dell PowerConnect W Group within AMP. During the discovery process you will move new discovered controllers into this group.

This chapter contains the following topics:

- "Basic Monitoring Configuration" on page 13
- "Advanced Configuration" on page 14

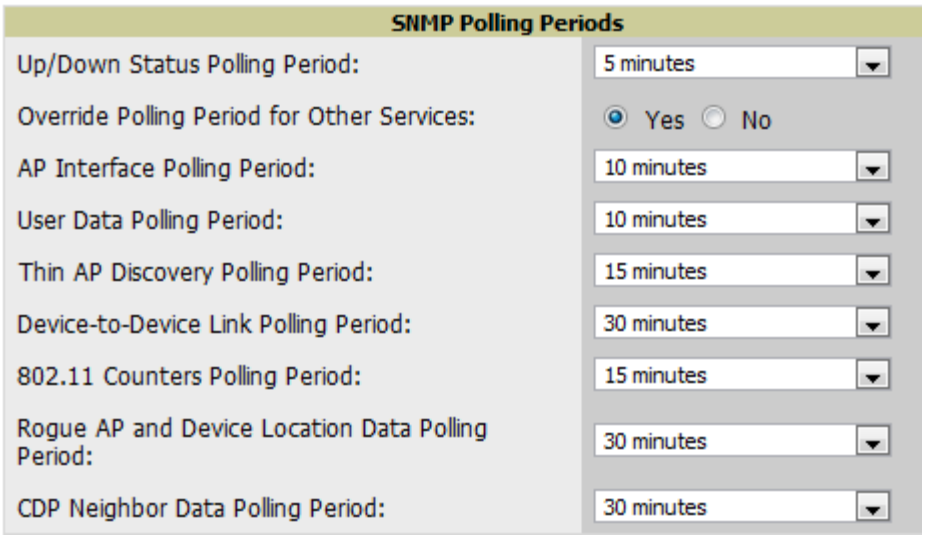
Basic Monitoring Configuration

1. Navigate to **Groups > List.**
2. Select **Add**.
3. Enter a **Name** that represents the Dell PowerConnect W-Series infrastructure from a security, geographical, or departmental perspective and select **Add**.
4. You will be redirected to the **Groups > Basic** page for the Group you just created. On this page you will need to tweak a few Dell PowerConnect W-specific settings.
5. Find the **SNMP Polling Periods** section of the page, as illustrated in Figure 5.
6. Change **Override Polling Period for Other Services** to **Yes.**
7. Ensure **User Data Polling Period** is set to 10 minutes. Do not configure this interval lower than 5 minutes.

NOTE: Enabling the SNMP Rate Limiting for Monitored Devices option in the previous chapter adds a small delay between each SNMP Get request, thus the actual polling interval is 12 minutes for 10 minute polling interval.

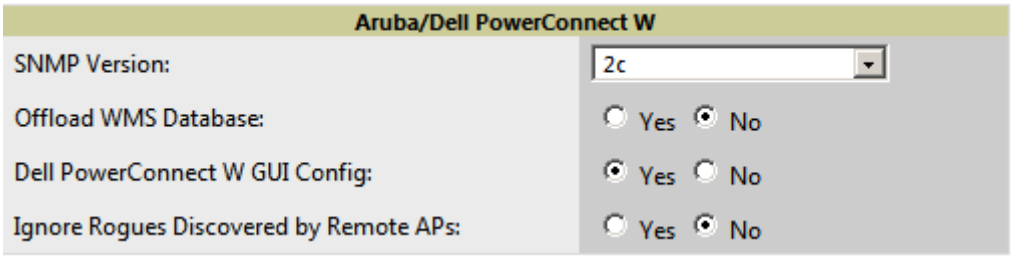
8. Change **Device-to-Device Link Polling Period** to **30 minutes.**
9. Change **Rogue AP and Device Location Data Polling Period** to **30 minutes.**

Figure 5 *SNMP Polling Periods section of* ***Groups > Basic***



10. Locate the **Aruba/Dell PowerConnect W** section of this page, as illustrated in Figure 6.
11. Configure the proper **SNMP Version** for monitoring the Dell PowerConnect W-Series infrastructure.

Figure 6 *Group SNMP Version for Monitoring*



12. Select **Save and Apply**.

Advanced Configuration

Refer to the *Dell PowerConnect W AirWave Configuration Guide* located at support.dell.com/manuals for detailed instructions.

Chapter 4

Discovering Dell PowerConnect W-Series Infrastructure

This chapter guides you through the process of discovering and managing your Dell PowerConnect W-Series infrastructure.

AMP utilizes Dell PowerConnect W-Series topology to efficiently discover downstream infrastructure.

Refer to the following earlier chapters in this book before attempting discovery:

- Chapter 2, “Configuring AirWave for Global Dell PowerConnect W-Series Infrastructure” on page 9
- Chapter 3, “Configuring a Dell PowerConnect W Group in AMP” on page 13

The following topics in this chapter walk through the basic procedure for discovering and managing Dell PowerConnect W-Series infrastructure:

- “Discovering Master Controllers” on page 15
- “Local Controller Discovery” on page 17
- “Thin AP Discovery” on page 17

NOTE: Always add one Controller and its affiliated Thin APs into management or monitoring mode in a serial fashion, one at a time. Adding new devices is a very CPU intensive process for AMP and can quickly overwhelm all of the processing power of the server if hundreds of Thin APs are added (migrated from New to Managed or Monitoring) simultaneously.

Discovering Master Controllers

Scan networks containing Dell PowerConnect W-Series Master controllers from **Device Setup > Discover.**

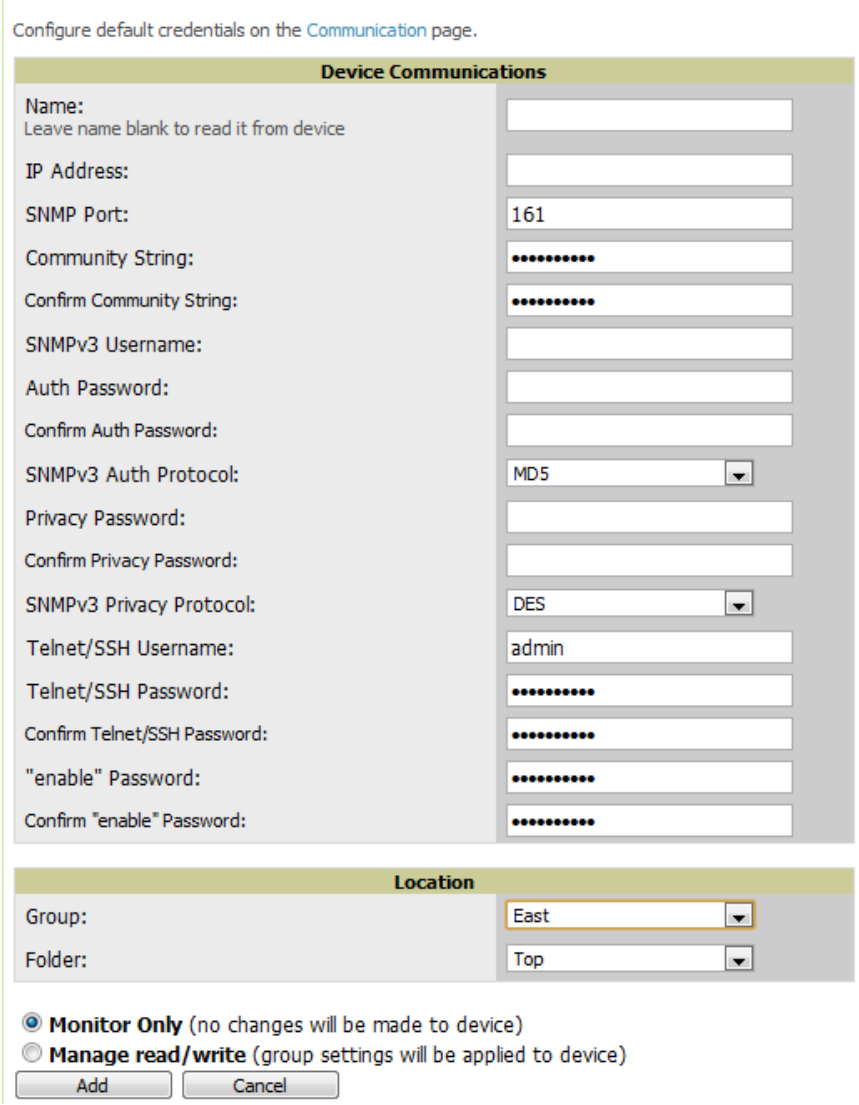
- or -

Manually enter the Master controller by following these steps in the **Device Setup > Add** page:

1. Select the Dell PowerConnect W-series controller type and select **Add**. The page illustrated on Figure 7 appears.
2. Enter the **Name** and the **IP Address** for the controller.
3. Enter **SNMP Community String**, which is required field for device discovery.

NOTE: Be sure to note the community string, because it must match the SNMP Trap community string which is configured later in this document.

Figure 7 *Dell PowerConnect W Credentials in* ***Device Setup > Add***



4. Enter the required fields for configuration and basic monitoring:
   - Telnet/SSH Username
   - Telnet/SSH password
   - “enable” password
5. Enter the required fields for WMS Offload
   - SNMPv3 Auth Protocol
   - SNMPv3 Privacy Protocol
   - SNMPv3 Username
   - Auth Password
   - Privacy Password

NOTE: The protocols should be SHA and DES in order for WMS Offload to work.

CAUTION: If you are using SNMPv3 and the controller's date/time is incorrect, the SNMP agent will not respond to SNMP requests from AMP SNMP manager. This will result in the controller and all of its downstream access points showing as Down in AMP.

6. Assign controller to a Group & Folder.
7. Ensure **Monitor Only** option is selected.
8. Select **Add.**
9. Navigate to **APs/Devices > New** page.
10. Select the Dell PowerConnect W Master controller you just added from the list of new devices.
11. Ensure **Monitor Only** option is selected.
12. Select **Add**.

Local Controller Discovery

Local controllers are added to AMP via the Master controller, by a discovery scan, or manually added in **Device Setup > Add**. After waiting for the Thin AP Polling Period interval or executing a Poll Now command from the **APs/Devices > Monitor** page, the Local controllers will appear on the **APs/Devices > New** page.

Add the Local controller to Group defined previously. Within AMP, Local controllers can be split away from the Master controller's Group.

NOTE: Local Controller Discovery/monitoring may not work as expected if Airwave is unable to communicate directly with the target device. Be sure and update any ACL/Firewall rules to allow AirWave to communicate with your network equipment.

Thin AP Discovery

Thin APs are discovered via the Local controller. After waiting for the Thin AP Polling Period or executing a Poll Now command from the **APs/Devices > Monitor** page, thin APs will appear on the **APs/Devices > New** page.

Add the thin APs to the Group defined previously. Within Dell PowerConnect W-AirWave, thin APs can be split away from the controller's Group. You can split thin APs into multiple Groups if required.

Chapter 5

AMP and Dell PowerConnect W-Series Integration Strategies

This chapter describes strategies for integrating AMP and Dell PowerConnect W-Series, and contains the following topics:

- "Integration Goals" on page 19
- "Example Use Cases" on page 20
- "Prerequisites for Integration" on page 21
- "Enable Stats Utilizing AMP" on page 21
- "WMS Offload Utilizing AMP" on page 22
- "Define AMP as Trap Host using ArubaOS CLI" on page 22
- "Understanding WMS Offload Impact on Dell PowerConnect W-Series infrastructure" on page 26

Integration Goals

The following table summarizes the types of integration goals and strategies for meeting them in certain architectural contexts:

Table 4 *Integration Goals in All Masters or Master/Local Architectures*

Integration Goals	All Masters Architecture	Master/ Local Architecture
Rogue & Client Info		enable stats
Rogue containment only	ssh access to controllers	ssh access to controllers
Rogue & Client containment	WMS Offload	WMS Offload
Reduce Master Controller Load		WMS Offload debugging off
IDS & Auth Tracking	Define AMP as trap host	Define AMP as trap host
Track Tag Location	enable RTLS WMS Offload	enable RTLS WMS Offload
Channel Utilization	enable AMON	enable AMON
Spectrum	enable AMON	enable AMON

Key integration points to consider include the following:

- IDS Tracking does not require WMS Offload in an All-Master or Master/Local environment
- IDS Tracking does require enable stats in a Master/Local environment
- WMS Offload will hide the Security Summary tab on Master Controller's web interface
- WMS Offload encompasses enable stats or enable stats is a subset of WMS Offload
- Unless you enable stats on the Local Controllers in a Master/Local environment, the Local Controllers do not populate their MIBs with any information about clients or rogue devices discovered/associated with their APs. Instead the information is sent upstream to Master Controller.

Example Use Cases

The following are example use cases of integration strategies:

When to Use Enable Stats

You want to pilot Dell PowerConnect W-AirWave and doesn't want to make major configuration changes to their infrastructure or manage configuration from AMP.

NOTE: Enable Stats still pushes a small subset of commands to the controllers via SSH.

See "Enable Stats Utilizing AMP" on page 21.

When to Use WMS Offload

- You have older Dell PowerConnect W-Series infrastructure in a Master/Local environment and their Master controller is fully taxed. Offloading WMS will increase the capacity of the Master Controller by offloading statistic gathering requirements and device classification coordination to AMP.
- You want to use AMP to distribute client and rogue device classification amongst multiple Master Controllers in a Master/Local environment or in an All-Masters environment.
- See the following topics:
  - "WMS Offload Utilizing AMP" on page 22
  - "Understanding WMS Offload Impact on Dell PowerConnect W-Series infrastructure" on page 26
  - "WMS Offload Details" on page 43

When to Use RTLS

- A hospital wants to achieve very precise location accuracy (5 -15 feet) for their medical devices which are associating to the WLAN.
- You want to locate items utilizing Wi-Fi Tags.

NOTE: RTLS could negatively impact your AMP server's performance.

- See "Leveraging RTLS to Increase Accuracy" on page 45.

When to Define AMP as Trap Host

- You want to track IDS events within the AMP UI.
- You are in the process of converting their older third-party WLAN devices to Dell PowerConnect W and want a unified IDS dashboard for all WLAN infrastructure.
- You want to relate Auth failures to a client device, AP, Group of APs, and controller. AMP provides this unique correlation capability.
- See "Define AMP as Trap Host using ArubaOS CLI" on page 22.

When to use Channel Utilization

- You have a minimum version of AOS 6.1.0.0 and Dell PowerConnect W-AP105 or Dell PowerConnect W-AP135

Prerequisites for Integration

If you have not discovered the Dell PowerConnect W-Series infrastructure or configured credentials, refer to the previous chapters of this book:

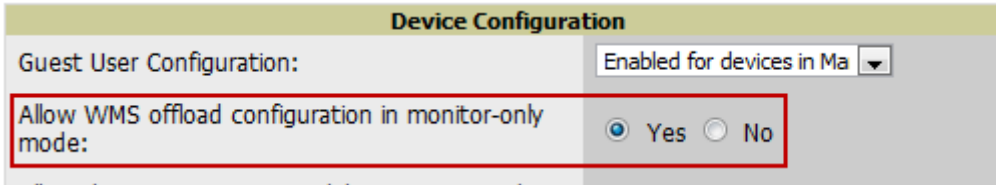
- Chapter 2, "Configuring AirWave for Global Dell PowerConnect W-Series Infrastructure" on page 9
- Chapter 3, "Configuring a Dell PowerConnect W Group in AMP" on page 13
- Chapter 4, "Discovering Dell PowerConnect W-Series Infrastructure" on page 15

Enable Stats Utilizing AMP

To enable stats on the Dell PowerConnect W-series controllers, follow these steps:

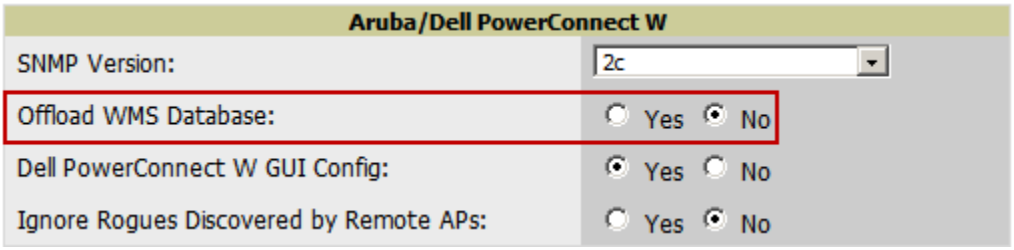
1. Navigate to **AMP Setup > General** and locate the **Device Configuration** section.
2. Set the **Allow WMS Offload Configuration in Monitor-Only Mode** field to **Yes**, as shown in Figure 8:

Figure 8 *WMS Offload Configuration in* ***AMP Setup > General***



3. Navigate to **Groups > Basic** for the group that contains your Dell PowerConnect W-series controllers.
4. Locate the **Dell PowerConnect W** section on the page.
5. Set the **Offload WMS Database** field to **No,** as shown in Figure 9:

Figure 9 ***Offload WMS Database*** *field in* ***Groups > Basic***



6. Select **Save and Apply**.
7. Select **Save**.

This will push a set of commands via SSH to all Dell PowerConnect W local controllers. AMP must have read/write access to the controllers in order to push these commands.

NOTE: This process will not reboot your controllers.

CAUTION: If you don't follow the above steps, local controllers will not be configured to populate statistics. This decreases AMP's capability to trend client signal information and to properly locate devices. See Appendix A, "CLI ArubaOS & AMP Commands" on page 37 on how to utilize ArubaOS CLI to enable stats on Dell PowerConnect W-Series infrastructure.

If your credentials are invalid or the changes are not applied to the controller, error messages will display on the controller's **APs/Devices > Monitor** page under the **Recent Events** section. If the change fails, AMP does not

audit these setting (display mismatches) and you will need to apply to the controller by hand. See Appendix A, "CLI ArubaOS & AMP Commands" on page 37 for detailed instructions.

These are the commands pushed by AMP while enabling WMS Offload (do not enter these commands):

```
configure terminal
no mobility-manager <Active WMS IP Address>
wms
general collect-stats enable
stats-update-interval 120
show wms general
write mem
```

WMS Offload Utilizing AMP

To offload WMS on the Dell PowerConnect W-Series controllers using AMP:

1. In **AMP Setup > General**, locate the **Device Configuration** section and enable or disable **Allow WMS Offload Configuration in Monitor-Only Mode.**
2. Select **Save and Apply**. This will push a set of commands via SSH to all Dell PowerConnect W Master Controllers. If the controller does not have an SNMPv3 user that matches the AMP database it will automatically create a new SNMPv3 user. AMP must have read/write access to the controllers in order to push these commands
3. Navigate to **Groups > Basic** and locate the Dell PowerConnect W section.
4. Set the **Offload WMS Database** field to **Yes**, as shown previously in Figure 9.

NOTE: This process will not reboot your controllers. See Appendix A, "CLI ArubaOS & AMP Commands" on page 37on how to utilize ArubaOS CLI to enable stats or WMS Offload.

CAUTION: The SNMPv3 user's Auth Password and Privacy Password must be the same.

Do not enter these commands; these are pushed by AMP while enabling WMS Offload.

```
configure terminal
mobility-manager <AMP IP> user <AMP SNMPv3 User Name> <AMP Auth/Priv PW>
stats-update-interval 120
write mem
```

NOTE: AMP will configure SNMPv2 traps with the mobile manager command.

Define AMP as Trap Host using ArubaOS CLI

To ensure the AMP server is defined a trap host, SSH into each controller (Master and Local), enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
```

```
(Controller-Name) (config) # snmp-server host <AMP IP ADDR> version 2c <SNMP COMMUNITY
STRING OF CONTROLLER>
```

NOTE: Ensure the SNMP community matches those that were configured in Chapter 2, "Configuring AirWave for Global Dell PowerConnect W-Series Infrastructure" .

```
(Controller-Name) (config) # snmp-server trap source <CONTROLLER'S IP>
(Controller-Name) (config) # write mem
```

CAUTION: Do not configure the SNMP version to v3 because AMP does not support SNMPv3 traps/informs.

ArubaOS Traps Utilized by AMP

The following are Auth, IDS, and ARM traps utilized by AMP:

- "Auth Traps" on page 23
- "IDS Traps" on page 23
- "ARM Traps" on page 24

Auth Traps

- wlsxNUserAuthenticationFailed
- wlsxNAuthServerReqTimedOut

IDS Traps

- wlsxwlsxSignatureMatchAP
- wlsxSignatureMatchSta
- wlsxSignAPNetstumbler
- wlsxSignStaNetstumbler
- wlsxSignAPAsleap
- wlsxSignStaAsleap
- wlsxSignAPAirjack
- wlsxSignStaAirjack
- wlsxSignAPNullProbeResp
- wlsxSignStaNullProbeResp
- wlsxSignAPDeauthBcast
- wlsxSignStaDeauthBcastwlsxChannelFrameErrorRateExceeded
- wlsxChannelFrameFragmentationRateExceeded
- wlsxChannelFrameRetryRateExceeded
- wlsxNIpSpoofingDetected
- wlsxStaImpersonation
- wlsxReservedChannelViolation
- wlsxValidSSIDViolation
- wlsxStaPolicyViolation
- wlsxRepeatWEPIVViolation
- wlsxWeakWEPIVViolation
- wlsxFrameRetryRateExceeded

- wlsxFrameReceiveErrorRateExceeded
- wlsxFrameFragmentationRateExceeded
- wlsxFrameBandWidthRateExceeded
- wlsxFrameLowSpeedRateExceeded
- wlsxFrameNonUnicastRateExceeded
- wlsxChannelRateAnomaly
- wlsxNodeRateAnomalyAP
- wlsxNodeRateAnomalySta
- wlsxEAPRateAnomaly
- wlsxSignalAnomaly
- wlsxSequenceNumberAnomalyAP
- wlsxSequenceNumberAnomalySta
- wlsxApFloodAttack
- wlsxInvalidMacOUIAP
- wlsxInvalidMacOUISta
- wlsxStaRepeatWEPIVViolation
- wlsxStaWeakWEPIVViolation
- wlsxStaAssociatedToUnsecureAP
- wlsxStaUnAssociatedFromUnsecureAP
- wlsxAPImpersonation
- wlsxDisconnectStationAttackAP
- wlsxDisconnectStationAttackSta

ARM Traps

- AP Power Change
- AP Mode Change
- AP Channel Change

Ensuring That IDS & Auth Traps Display in AMP Using CLI

Validate your ArubaOS configuration by exiting the configure terminal mode and issue the following command:

```
(Controller-Name) # show snmp trap-list
```

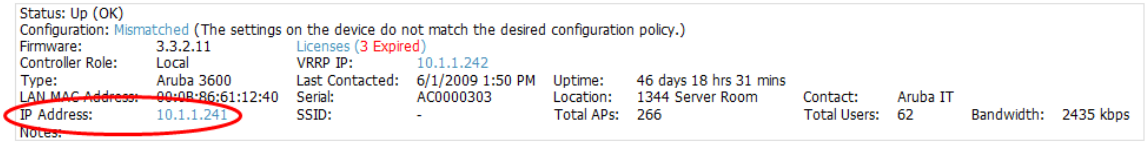
If any of the traps below don't show as enabled enter **`configure terminal`** mode and issue the following command:

```
(Controller-Name) (config) # snmp-server trap enable <TRAPS FROM LIST ABOVE>
(Controller-Name) (config) # write mem
```

NOTE: See Appendix A, “CLI ArubaOS & AMP Commands” on page 37 for the full command that can be copied and pasted directly into the ArubaOS CLI.

Ensure the source IP of the traps match the IP that AMP utilizes to manage the controller, as shown in Figure 10. Navigate to **APs/Devices > Monitor** to validate the IP address in the **Device Info** section.

Figure 10 *Verify IP Address on* ***APs/Devices > Monitor*** *Page*



Verify that there is a SNMPv2 community string that matches the SNMP Trap community string on the controller.

```
(Controller-Name) # show snmp community
SNMP COMMUNITIES
----------------
COMMUNITY ACCESS      VERSION
--------- ------      -------
public    READ_ONLY V1, V2c

(Controller-Name) # #show snmp trap-host

SNMP TRAP HOSTS
---------------
HOST           VERSION    SECURITY NAME PORT   TYPE TIMEOUT RETRY
----           -------    ------------- ----   ---- ------- -----
10.2.32.4      SNMPv2c    public         162    Trap N/A      N/A
```

Verify firewall port **162** (default) is **open** between AMP and the controller.

Validate traps are making it into AMP by issuing the following commands from AMP command line.

```
[root@AMP ~]# qlog enable snmp_traps

[root@AMP ~]# tail -f /var/log/amp_diag/snmp_traps

1241627740.392536 handle_trap|2009-05-06 09:35:40 UDP: [10.2.32.65]->[10.51.5.118]:-
32737 sends trap: DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (127227800) 14 days,
17:24:38.00 SNMPv2-MIB::snmpTrapOID.0 = OID: SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.2.1106 SNMPv2-SMI::enterprises.14823.2.3.1.11.1.1.60
= Hex-STRING: 07 D9 05 06 09 16 0F 00 2D 08 00    SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.5.0 = Hex-STRING: 00 1A 1E 6F 82 D0 SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.6.0 = STRING: aruba-apSNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.1.0 = Hex-STRING: 00 1A 1E C0 2B 32 SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.56.0 = INTEGER: 2    SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.17.0 = STRING: aruba-124-c0:2b:32 SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.18.0 = INTEGER: 11   SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.58.0 = STRING: http://10.51.5.118/screens/wmsi/
reports.html?mode=ap&bssid=00:1a:1e:6f:82:d0
```

NOTE: You will see many IDS and Auth Traps from this command. AMP only processes a small subset of these Traps which display within AMP. The Traps that AMP does process are listed above.

Ensure you disable qlogging after testing as it could negatively impact AMP performance if left turned on:

```
[root@AMP ~]# qlog enable snmp_traps
```

Understanding WMS Offload Impact on Dell PowerConnect W-Series infrastructure

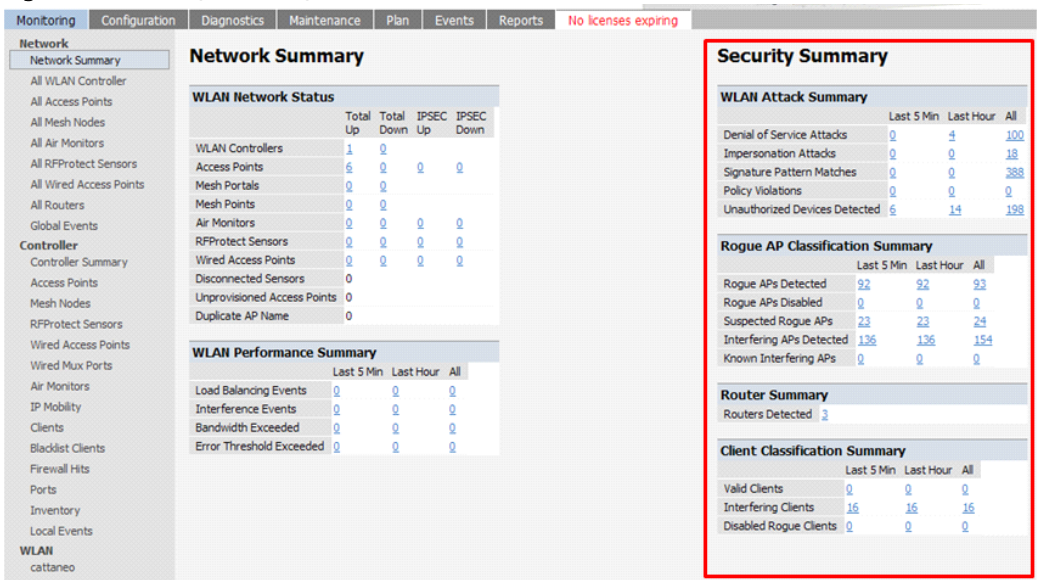
When offloading WMS, it is important to understand what functionality is migrated to AMP and what functionality is deprecated.

The following ArubaOS tabs and sections are deprecated after offloading WMS:

- **Plan Tab -** where floor plans are stored and heatmaps are generated. Prior to offloading WMS, ensure that you have exported floor plans from ArubaOS and imported into AMP. All functionality within the Plan Tab is incorporated with the VisualRF module in AMP.
- **Report Tab** - All reports are incorporate within AMP.
- **Events Tab** - the majority of functionality within this Tab is incorporate within AMP Reports and Alerts sections with the exception of:
  - Interference Detected
  - Rogue AP
  - Station Failed
  - Suspected Rogue AP

The **Security Summary** section (Figure 11) disappears after offloading WMS. The data is still being processed by the Master Controller, but the summary information is not available. AMP does provide the ability to view some of this information in detail and summary form.

Figure 11 *Security Summary on Master Controller*



WLAN Attack Summary

- DOS Attacks - no summary data available in AMP
- Impersonation Attacks - no summary data available in AMP
- Signature Pattern Matches - partial summary data available on Home and RAPIDS > Overview pages
- Policy Violations - no summary data available in AMP
- Unauthorized Devices Detected - no summary data available in AMP

Rogue AP Classification Summary

- Rogue APs Detected - summary data available on **RAPIDS > Overview**
- Rogue APs Disabled - no summary data available in AMP
- Suspected Rogue APs - partial data is available in AMP on each APs/Devices > Manage page
- Interfering APs Detected - partial data is available in AMP on each APs/Devices > Manage page

- Known Interfering APs - partial data is available in AMP on each APs/Devices > Manage page

Router Summary

- Routers Detected - no summary data available in AMP

Client Classification Summary

- Valid Clients - summary data available on all pages in the dashboard
- Interfering clients - no summary data available in AMP
- Disabled Clients - no summary data available in AMP

See "Rogue Device Classification" on page 33 for more information on security, IDS, WIPS, WIDS, classification, and RAPIDS.

Chapter 6

Dell PowerConnect W-Specific Capabilities in AMP

This chapter discusses Dell PowerConnect W-specific capabilities in AMP, and contains the following topics:

- "Dell PowerConnect W Traps for RADIUS Auth & IDS Tracking" on page 29
- "Remote AP Monitoring" on page 30
- "ARM & Channel Utilization Information" on page 30
- "Viewing Controller License Information" on page 32
- "Rogue Device Classification" on page 33
- "Rules-Based Controller Classification" on page 34

Dell PowerConnect W Traps for RADIUS Auth & IDS Tracking

The authentication failure traps are received by the AMP server and correlated to the proper controller, AP, and user. See Figure 12 showing all authentication failures related to a controller.

Figure 12 *RADIUS Authentication Traps in AMP*

RADIUS Authentication Issues for HQ-Aruba-Controller in group Acme Corporation in folder Top > Acme Corporation > Corporate HQ | Return to AP/Device Monitor page

Event Type ▲	Last 2 Hours	Last 24 Hours	Total
Client authentication failed	0	4	1103

1-20 of 1103 RADIUS Authentication Issues Page 1 of 56 > >|

Event	Username	User MAC Address	AP	Radio	RADIUS Server	Time ▼
Client authentication failed for 00:0B:7D:0C:19:E9	-	00:0B:7D:0C:19:E9	-	-	-	4/2/2008 5:24 PM
Client authentication failed for 00:17:3F:20:99:6B	-	00:17:3F:20:99:6B	-	-	-	4/2/2008 4:21 PM

The IDS traps are received by the AMP server and correlated to the proper controller, AP, and user. See Figure 13 showing all IDS traps related to a controller.

Figure 13 *IDS Traps in AMP*

IDS Events for HQ-Aruba-Controller in group Acme Corporation in folder Top > Acme Corporation > Corporate HQ | Return to AP/Device Monitor page

Attack ▲	Last 2 Hours	Last 24 Hours	Total
Deauth-Broadcast	0	0	47
Netstumbler Generic	13	122	1756
Null-Probe-Response	22	263	2776
3 Attack Types	35	385	4579

1-20 ▼ of 4579 IDS Events Page 1 ▼ of 229 > >|

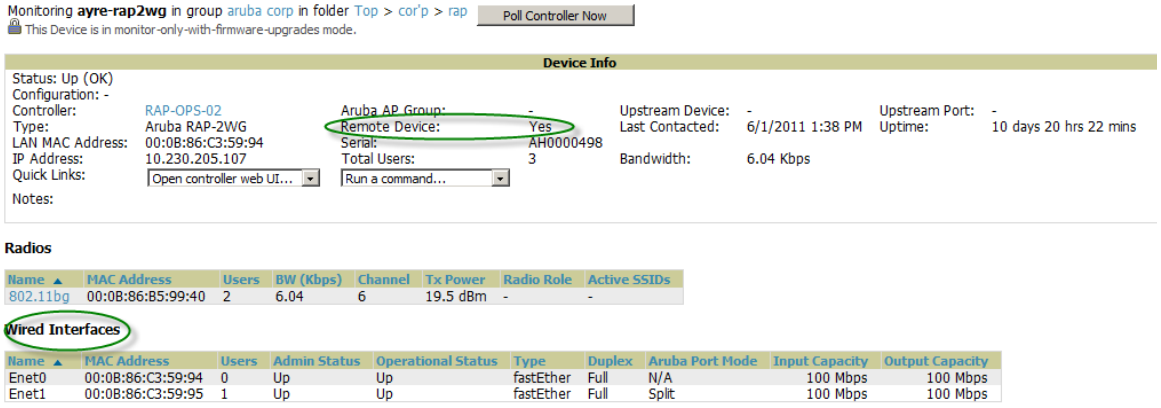
Attack	Attacker	AP	Radio	Channel	SNR	Precedence	Time ▼
Null-Probe-Response	00:20:A6:49:92:AE	HQ-Aruba-Boardroom	802.11a	-	13	-	7/17/2008 1:58 PM
Null-Probe-Response	00:0D:97:00:81:6A	HQ-Northeast-Corner-b6b6	802.11bg	-	23	-	7/17/2008 1:56 PM
Null-Probe-Response	00:20:A6:49:92:AE	HQ-Southwest-Corner-eb3e	802.11a	-	39	-	7/17/2008 1:41 PM

Remote AP Monitoring

To monitor remote APs, follow these steps:

1. From the **APs/Devices > List** page, filter on the **Remote Device** column to find remote devices.
2. To view detailed information on the remote device, select the device name. The page illustrated in Figure 14 appears.

Figure 14 *Remote AP Detail Page*


Monitoring ayre-rap2wg in group aruba corp in folder Top > cor'p > rap
Poll Controller Now
This Device is in monitor-only-with-firmware-upgrades mode.
Device Info
Status: Up (OK)
Configuration: -
Controller: RAP-OPS-02
Type: Aruba RAP-2WG
LAN MAC Address: 00:0B:86:C3:59:94
IP Address: 10.230.205.107
Quick Links: Open controller web UI... Run a command...
Notes:
Aruba AP Group: -
Remote Device: Yes
Serial: AH0000498
Total Users: 3
Upstream Device: -
Last Contacted: 6/1/2011 1:38 PM
Bandwidth: 6.04 Kbps
Upstream Port: -
Uptime: 10 days 20 hrs 22 mins
Radios
Name MAC Address Users BW (Kbps) Channel Tx Power Radio Role Active SSIDs
802.11bg 00:0B:86:B5:99:40 2 6.04 6 19.5 dBm - -
Wired Interfaces
Name MAC Address Users Admin Status Operational Status Type Duplex Aruba Port Mode Input Capacity Output Capacity
Enet0 00:0B:86:C3:59:94 0 Up Up fastEther Full N/A 100 Mbps 100 Mbps
Enet1 00:0B:86:C3:59:95 1 Up Up fastEther Full Split 100 Mbps 100 Mbps

3. You can also see if there are users plugged into the wired interfaces in the Connected Users list.

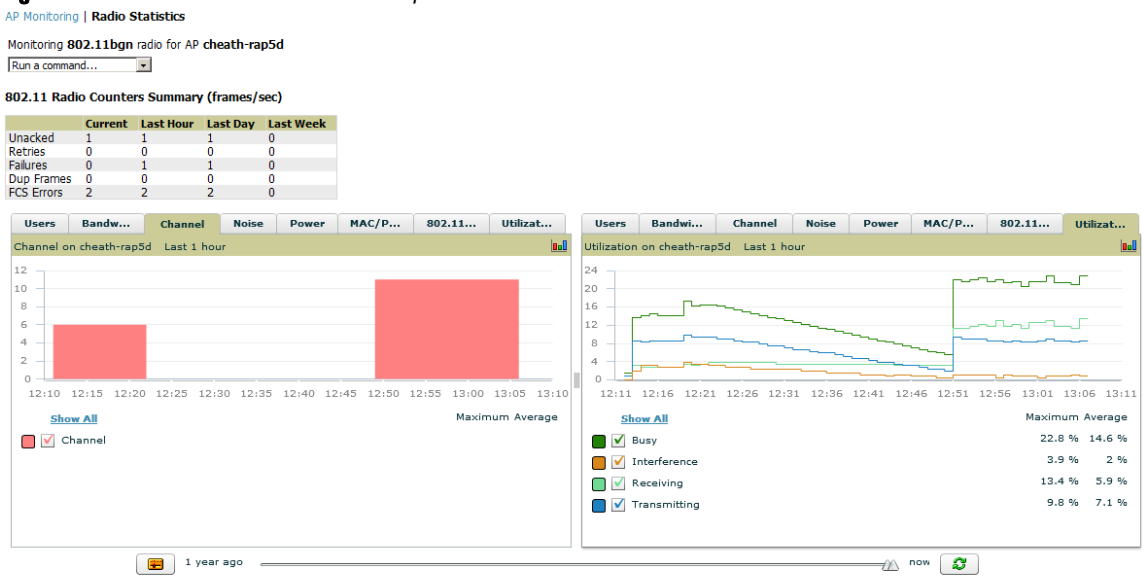
NOTE: This feature is only available when the remote APs are in split tunnel and tunnel modes.

ARM & Channel Utilization Information

ARM statistics & Channel utilization are very powerful tools for diagnosing capacity and other issues in your WLAN.

1. Navigate to an **APs/Devices > Monitor** page for any of the following Dell PowerConnect W models: Dell PowerConnect W-AP105, Dell PowerConnect W-AP92, Dell PowerConnect W-AP93, Dell PowerConnect W-AP124, or Dell PowerConnect W-AP125.
2. In the **Radios** table, select a radio link under the **Name** column for a radio.

Figure 15 *ARM and Channel Utilization Graphs*


AP Monitoring | Radio Statistics
Monitoring 802.11bgn radio for AP cheath-rap5d
Run a command...
802.11 Radio Counters Summary (frames/sec)
Current Last Hour Last Day Last Week
Unacked 1 1 1 0
Retries 0 0 0 0
Failures 0 1 1 0
Dup Frames 0 0 0 0
FCS Errors 2 2 2 0
Users Bandw... Channel Noise Power MAC/P... 802.11... Utilizat...
Channel on cheath-rap5d Last 1 hour
Show All
Maximum Average
Channel
Utilization on cheath-rap5d Last 1 hour
Busy 22.8 % 14.6 %
Interference 3.9 % 2 %
Receiving 13.4 % 5.9 %
Transmitting 9.8 % 7.1 %
1 year ago
now

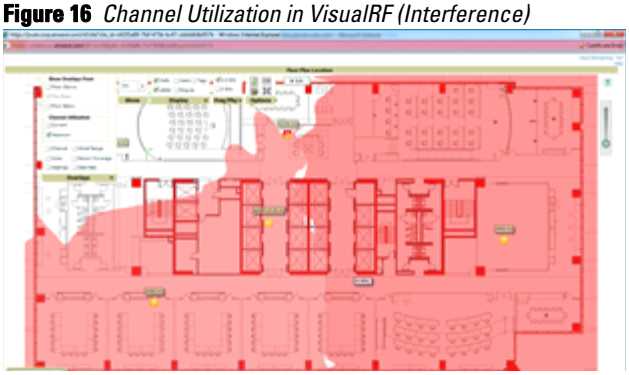
See the *Dell PowerConnect W-AirWave 7.3 User Guide* in **Home > Documentation** for more information on the data displayed in the **Radio Statistics** page for these devices.

VisualRF and Channel Utilization

To view how channel utilization is impacting an area within a building, follow these steps:

1. Navigate to a floor plan by clicking on the thumbnail on a device's **APs/Devices > Monitor** page or navigating to **VisualRF > Floor Plans** page.
2. Select the **Overlays** menu.
3. Select **Utilization** overlay.
4. Select **Current** or **Maximum** (over last 24 hours).
5. Select total (default), receive, transmit, or interference (see Figure 16).

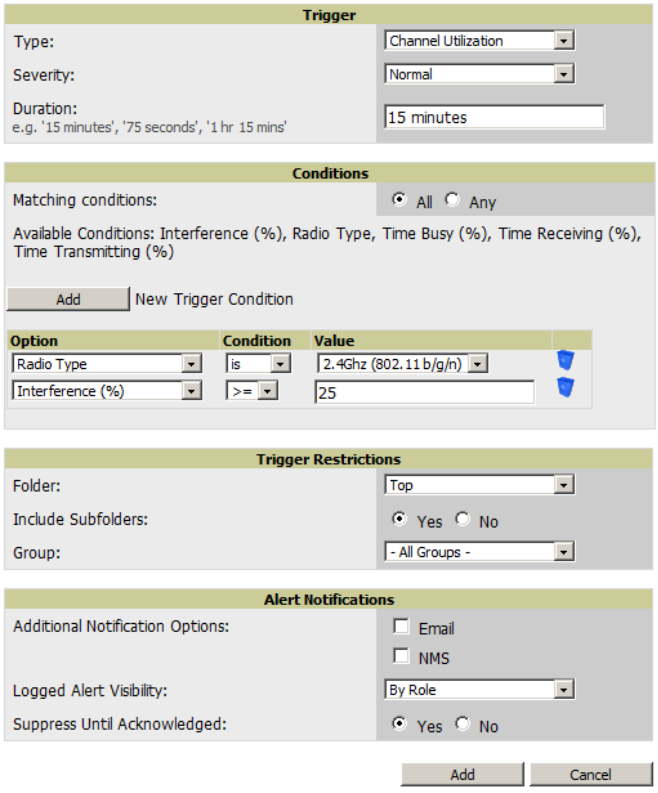
Figure 16 *Channel Utilization in VisualRF (Interference)*



Configuring Channel Utilization Triggers

1. Navigate to **System > Triggers** and select **Add**.
2. Select **Channel Utilization** from the **Type** drop-down menu as seen on Figure 17:

Figure 17 *Channel Utilization Trigger*



3. Enter the duration evaluation period.
4. Select **Add New Trigger Condition**.
5. Create a trigger condition for **Radio Type** and select the frequency to evaluate.
6. Select total, receive, transmit, or interference trigger condition.
7. Set up any restrictions or notifications (refer to the *Dell PowerConnect W-AirWave 7.3 User Guide* in **Home > Documentation** for more details)
8. When finished, select **Add**.

Viewing Channel Utilization Alerts

1. Navigate to **APs/Devices > Monitor** or **System > Alerts**.
2. Sort the **Trigger Type** column and find **Channel Utilization** alerts.

View Channel Utilization in RF Health Reports

1. Navigate to **Reports > Generated**.
2. Find and select a Device Summary or RF Health report.

Figure 18 *Channel Utilization in an RF Health Report*

Most Utilized by Channel Usage (2.4 GHz)

Rank ▲	Device	Channel Busy (%)	Interference (%)	Number of Users	Bandwidth (bps)	Location	Controller
1	AP0018.19bd.b1d0	85.43	83.86	0	14.00	ap lab	wlc 5500
2	AP001d.a1fc.ca7a	85.04	83.86	0	32.00	default location	wlc 5500
3	Cisco-13:21:1E	67.72	59.45	0	4.00	default location	wlc 5500
4	AP10	64.57	63.39	0	24.00	Sales Office-helloX	Cisco4400

Viewing Controller License Information

Follow these steps to view your controller's license information in AMP:

1. Navigate to the **APs/Devices > Monitor** page of a controller under AMP management.
2. Select the **License** link in the **Device Info** section. A pop-up window, shown on Figure 19, appears listing all licenses.

Figure 19 *License Popup from **APs/Devices > Monitor***

License Table for alpha-local-1:

Service Type ▲	Installed	Expires	Flag	Key
Client Integrity Module	4/29/2005 12:36 PM		E	n9XQpMZN-kUMfht6z-j98lcV0J-TSIKt4In-xA2LlFT0-v58
External Services Interface	4/29/2005 12:35 PM		E	PiF8DrBV-nBXlkp75-+Z8TT2NS-aj4oa8/h-VVm+CxB6-zVU
External Services Interface	4/29/2005 12:34 PM		E	OMsNveDX-W3wEHSKx-TpXkQbHV-NyTb3HAN-OYAi2zNY-V
Indoor Mesh Access Points: 256	10/19/2007 6:54 PM		E	lKwFlaJR-6y8p6rm+-CzOUh7tl-bMhkMA1v-1DV+2m+H-kZE
MMC AP	10/19/2007 6:54 PM		E	WP6JN8l5-y4AoaG9p-P2r7wVTk-/PXV3JgR-C0fcj3d4-LLk
Ortronics Access Points: 256	10/19/2007 6:54 PM		E	+jl6oDRK-PiRXv5nF-l1DMwrDJ-oES1ydXR-4K7sFEHQ-SmU
Outdoor Mesh Access Points: 100	5/2/2007 2:51 PM	Expired		99CSOvuL-jL4Z0YkS-Q8lov2bI-BS+Y0Vxi-YkC9TT0V-5js
Outdoor Mesh Access Points: 256	10/19/2007 6:54 PM		E	RKC/wjVj-fcRQGlDi-K/F8vurv-oYRwgCuG-CsmY7wYh-w18
Outdoor Mesh Access Points: 64	8/1/2007 3:59 PM		E	C5i/bSFb-yVOxff0h-BWWUVEVe-Glb2xz4A-LKcq440D-IXQ
Policy Enforcement Firewall	4/29/2005 12:30 PM		E	vDXRo7pz-Jo8asgU2-HG7w74l+-zzl3yGKu-zZ7w3rJ+-/1I
Remote Access Points: 256	10/19/2007 6:54 PM		E	QnR882W+-o1Kb2XcR-2vrePyl+-J++rWbxh-jtCqjH3h-LPU
Remote Access Points: 48	4/29/2005 12:38 PM		E	5zz7c0jO-LpDgDbLH-4bEnzNbg-p/oEnS2a-nTtHaS8t-ms0
Voice Services Module	10/19/2007 6:54 PM		E	Lj/ByOfs-wMdJU3Xv-5djAkCIJ-vJ9zRok3-sWZ4Z2bn-aH4
VPN Server	4/29/2005 12:32 PM		E	SOKR1Sa8-KKMjj/Gv-HlcJcwaK-uEZuPvcs-c/LIzjg0-2iE
Wireless Intrusion Protection	4/29/2005 12:33 PM		E	xVc/llqw-Os1ei+yL-b1CqzoTr-UwGp2OAi-LD6wHOW2-qSw
xSec Module	4/29/2005 12:37 PM		E	ukxUwAcB-PE+GeyB9-7u7IMtQ1-CaibELI2-LuqdRsqA-fac

Rogue Device Classification

Only complete this section if you have completed WMS Offload procedure above. After offloading WMS, AMP maintains the primary ARM, WIPS, and WIDS state classification for all devices discovered over-the-air.

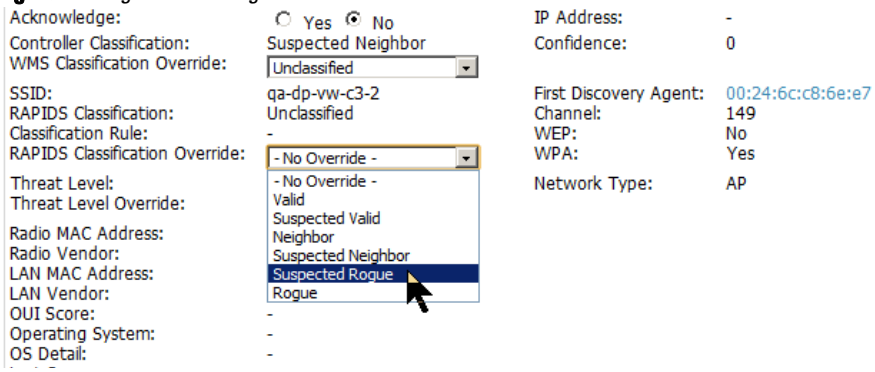
Table 5 *WIPS/WIDS to AMP Controller Classification Matrix*

AMP Controller Classification	AOS (WIPS/WIDS)
Unclassified (default state)	Unknown
Valid	Valid
Suspected Neighbor	Interfering
Neighbor	Known Interfering
Suspected Rogue	Suspected Rogue
Rogue	Rogue
Contained Rogue	DOS

To check and reclassify rogue devices, follow these steps:

1. Navigate to the **Rogue > Detail** page for the rogue device, as shown in Figure 20.

Figure 20 *Rogue Detail Page Illustration*



2. Select the proper classification from the **RAPIDS Classification Override** drop-down menu.

△ **CAUTION: Changing the controller's classification within the AMP UI will push a reclassification message to all controllers managed by the AMP server that are in Groups with Offloading the WMS database set to Yes. To reset the controller classification of a rogue device on AMP, change the controller classification on the AMP UI to unclassified.**

Controller classification can also be updated from **RAPIDS > List** via the **Modify Devices** link.

All rogue devices will be set to a default controller classification of unclassified when WMS is first offloaded except for devices classified as valid. Rogue devices classified in AOS as valid will also be classified within AMP as valid for their controller classification as well. As APs report subsequent classification information about rogues, this classification will be reflected within AMP UI and propagated to controllers that AMP manages. The device classification reflected in the Controller's UI and in the AMP UI will probably not match, because the Controller/APs do not reclassify rogue devices frequently.

To update a group of devices' controller classification to match the AOS device classification, navigate to **RAPIDS > List** and utilize the **Modify Devices** checkbox combined with the multiple sorting a filtering features.

Table 6 *ARM to AMP Classification Matrix*

AMP	ArubaOS (ARM)
Unclassified (default state)	Unknown
Valid	Valid
Contained	DOS

1. Navigate to the **Users > User Detail** page for the user.
2. Select the proper classification from the **Classification** drop-down menu as seen in Figure 21:

Figure 21 *User Classification*

△ **CAUTION: Changing User Classification within the AMP UI will push a user reclassification message to all controllers managed by the AMP server that are in Groups with Offloading the WMS database set to Yes.**

All users will be set to a default classification of unclassified when wms is first offloaded. As APs report subsequent classification information about users, this classification will be reflected within AMP UI and propagated to controllers that AMP manages. It is probable that the user's classification reflected in the controller's UI and in the AMP UI will not match, because the controller/APs do not reclassify users frequently.

There is no method in the AMP UI to update user classification on mass to match the controller's classification. Each client must be updated individually within the AMP UI.

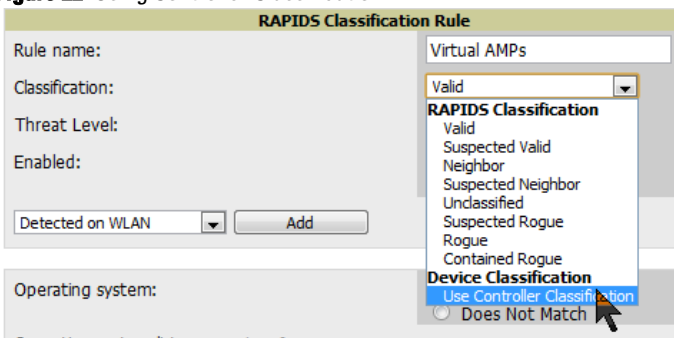
Rules-Based Controller Classification

Using RAPIDS Defaults for Controller Classification

To use the controller's classification as RAPIDS classification, follow these steps:

1. Navigate to **RAPIDS > Rules** and select the pencil icon for a rule.
2. In the **Classification** drop-down menu, select **Use Controller Classification** as seen in Figure 22.
3. Select **Save**.

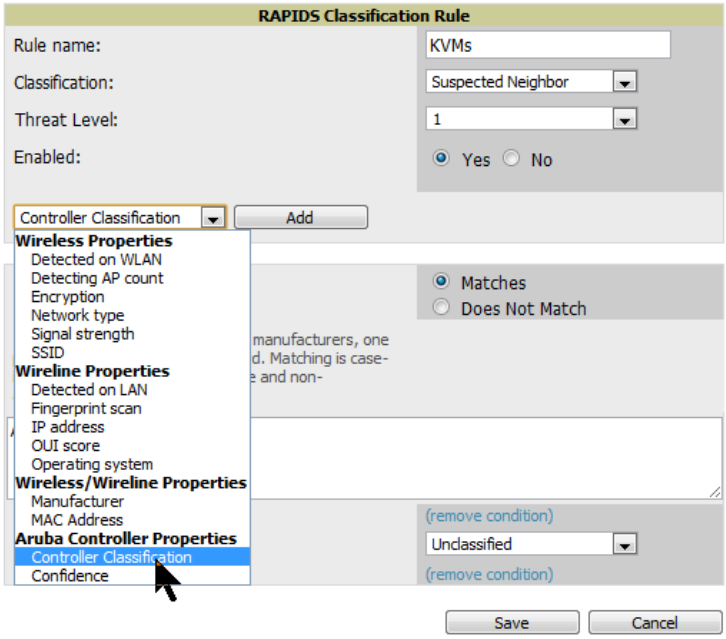
Figure 22 *Using Controller Classification*



Changing RAPIDS based on Controller Classification

1. Navigate to **RAPIDS > Rules**.
2. In the **Classification** drop-down menu, select desired RAPIDS classification.
3. Select **Controller Classification** from drop-down menu, as shown in Figure 23.

Figure 23 *Configure Rules for Classification*



4. Select **Add**.
5. Select desired controller classification to use as an evaluation in RAPIDS.
6. Select **Save**.

Enable Channel Utilization Events Utilizing ArubaOS CLI (Local and Master Controllers)

CAUTION: Enabling these commands on ArubaOS versions prior to 6.1 can result in performance issues on the controller.

SSH into the controller, and enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # mgmt-server type amp primary-server <AMP IP>
(Controller-Name) (config) # write mem
```

Enable Stats With the ArubaOS CLI (Local Controller in Master Local Environment)

NOTE: Do not use these commands if using AMP GUI.

CAUTION: Enabling these commands on ArubaOS versions prior to 6.1 can result in performance issues on the controller.

SSH into the controller, and enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # wms general collect-stats enable
(Controller-Name) (config) # write mem
```

Offload WMS Utilizing ArubaOS CLI and AMP CLI (SNMP Walk)

NOTE: Do not use these commands if using AMP GUI.

ArubaOS CLI

SSH into all controllers (local and master), and enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # mobility-manager <AMP IP> user <MMS-USER> <MMS-SNMP-
PASSWORD> trap-version 2c
```

NOTE: This command creates an SNMPv3 user on the controller with authentication protocol configured to 'sha' and privacy protocol 'DES'. The user and password must be at least eight characters, because the Net-SNMP package in AMP adheres to this IETF recommendation. ArubaOS automatically creates Auth and Privacy passwords from this single password. If mobility-manager is already using a preconfigured SNMPv3 user ensure the Privacy & Authentication passwords are the same.

This command also creates the AMP server as an SNMPv3 Trap Host in the controller's running configuration.

Sample: `mobility-manager 10.2.32.1 user airwave123 airwave123`

```
(Controller-Name) (config) # write mem
```

AMP SNMP

Login into the Dell PowerConnect W-AirWave server with proper administrative access and issue the following command for all controllers (master and locals):

NOTE: Do not use these commands if using AMP GUI.

```
[root@AMP ~]# snmpwalk -v3 -a SHA -l AuthPriv -u <MMS-USER> -A <MMS-SNMP-PASSWORD> -X
<MMS-SNMP-PASSWORD> <ARUBA CONTROLLER IP ADDRESS> wlsxSystemExtGroup

WLSX-SYSTEMEXT-MIB::wlsxSysExtSwitchIp.0 = IpAddress: 10.51.5.222
WLSX-SYSTEMEXT-MIB::wlsxSysExtHostname.0 = STRING: aruba-3600-2
.
..
WLSX-SYSTEMEXT-MIB::wlsxSysExtSwitchLastReload.0 = STRING: User reboot.
WLSX-SYSTEMEXT-MIB::wlsxSysExtLastStatsReset.0 = Timeticks: (0) 0:00:00.00 response
[root@AMP ~]#
```

NOTE: Unless this SNMP walk command is issued properly on all of the controllers, they will not properly populate client and rogue statistics. Ensure the user and passwords match exactly to those entered in above sections.

Sample: `snmpwalk -v3 -a SHA -l AuthPriv -u airwave123 -A airwave123 -X airwave123 10.51.3.222 wlsxSystemExtGroup`

If you do not use AMP GUI to offload WMS, you must add a cronjob on the AMP server to ensure continued statistical population. Because the MIB walk/touch does not persist through a controller reboot, a cronjob is required to continually walk and touch the MIB.

Ensuring Master Controller Pushes Config to Local Controllers Utilizing ArubaOS CLI

NOTE: Do not use these commands if using AMP GUI.

```
(Controller-Name) (config) # cfgm mms config disable
```

NOTE: This command ensures configuration changes made on the master controller will propagate to all local controllers.

```
(Controller-Name) (config) # write mem
```

Disable Debugging Utilizing ArubaOS CLI

If you are experiencing performance issues on the Master Controller, ensure that debugging is disabled. It should be disabled by default. Debugging coupled with gathering the enhanced statistics can put a strain on the controllers CPU, so it is highly recommended to disable debugging.

To disable debugging, SSH into the controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # show running-config | include logging level debugging
```

If there is output, then use the following commands to remove the debugging:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # no logging level debugging <module from above>
(Controller-Name) (config) # write mem
```

Restart WMS on Local Controllers Utilizing ArubaOS CLI

To ensure local controllers are populating rogue information properly, SSH into each local controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
(Controller-Name) (config) # process restart wms
```

NOTE: You will need to wait until the next Rogue Poll Period to execute a Poll Now for each local controller to see rogue devices begin to appear in AMP after executing `restart wms` in ArubaOS.

Configure ArubaOS CLI when not Offloading WMS to AMP (AOS 6.0 & GT)

To ensure proper event correlation for IDS events when WMS if not offloaded to AMP, SSH into each controller (Master and Local), enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
(Controller-Name) (config) # ids management-profile
(Controller-Name) (config) # ids general-profile <name>
(Controller-Name) (config) # ids-events logs-and-traps
(Controller-Name) (config) # write mem
```

Copy & Paste to Enable Proper Traps With the ArubaOS CLI

To ensure the proper traps are configured on Dell PowerConnect W-series controllers copy and paste the following command after entering "enable" mode and issuing the configure terminal command:

```
snmp-server trap enable wlsxNUserAuthenticationFailed
snmp-server trap enable wlsxUserAuthenticationFailed
snmp-server trap enable wlsxNAuthServerReqTimedOut
snmp-server trap enable wlsxSignatureMatchAP
snmp-server trap enable wlsxSignatureMatchSta
snmp-server trap enable wlsxSignAPNetstumbler
snmp-server trap enable wlsxSignStaNetstumbler
snmp-server trap enable wlsxSignAPAsleap
snmp-server trap enable wlsxSignStaAsleap
snmp-server trap enable wlsxSignAPAirjack
snmp-server trap enable wlsxSignStaAirjack
snmp-server trap enable wlsxSignAPNullProbeResp
snmp-server trap enable wlsxSignStaNullProbeResp
snmp-server trap enable wlsxSignAPDeauthBcast
snmp-server trap enable wlsxSignStaDeauthBcastwlsxChannelFrameErrorRateExceeded
snmp-server trap enable wlsxChannelFrameFragmentationRateExceeded
snmp-server trap enable wlsxChannelFrameRetryRateExceeded
snmp-server trap enable wlsxNIpSpoofingDetected
snmp-server trap enable wlsxStaImpersonation
snmp-server trap enable wlsxReservedChannelViolation
snmp-server trap enable wlsxValidSSIDViolation
snmp-server trap enable wlsxStaPolicyViolation
snmp-server trap enable wlsxRepeatWEPIVViolation
snmp-server trap enable wlsxWeakWEPIVViolation
snmp-server trap enable wlsxFrameRetryRateExceeded
snmp-server trap enable wlsxFrameReceiveErrorRateExceeded
snmp-server trap enable wlsxFrameFragmentationRateExceeded
snmp-server trap enable wlsxFrameBandWidthRateExceeded
snmp-server trap enable wlsxFrameLowSpeedRateExceeded
snmp-server trap enable wlsxFrameNonUnicastRateExceeded
snmp-server trap enable wlsxChannelRateAnomaly
snmp-server trap enable wlsxNodeRateAnomalyAP
snmp-server trap enable wlsxNodeRateAnomalySta
snmp-server trap enable wlsxEAPRateAnomaly
snmp-server trap enable wlsxSignalAnomaly
snmp-server trap enable wlsxSequenceNumberAnomalyAP
snmp-server trap enable wlsxSequenceNumberAnomalySta
snmp-server trap enable wlsxApFloodAttack
snmp-server trap enable wlsxInvalidMacOUIAP
snmp-server trap enable wlsxInvalidMacOUISta
snmp-server trap enable wlsxStaRepeatWEPIVViolation
snmp-server trap enable wlsxStaWeakWEPIVViolation
snmp-server trap enable wlsxStaAssociatedToUnsecureAP
snmp-server trap enable wlsxStaUnAssociatedFromUnsecureAP
snmp-server trap enable wlsxAPImpersonation
snmp-server trap enable wlsxDisconnectStationAttackAP
snmp-server trap enable wlsxDisconnectStationAttackSta
```

NOTE: You will need to issue the **`write mem`** command.

Appendix B

How AMP Acquires Data from Dell PowerConnect W-Series devices

Table 7 *How AMP Acquires Data from Dell PowerConnect W-Series devices*

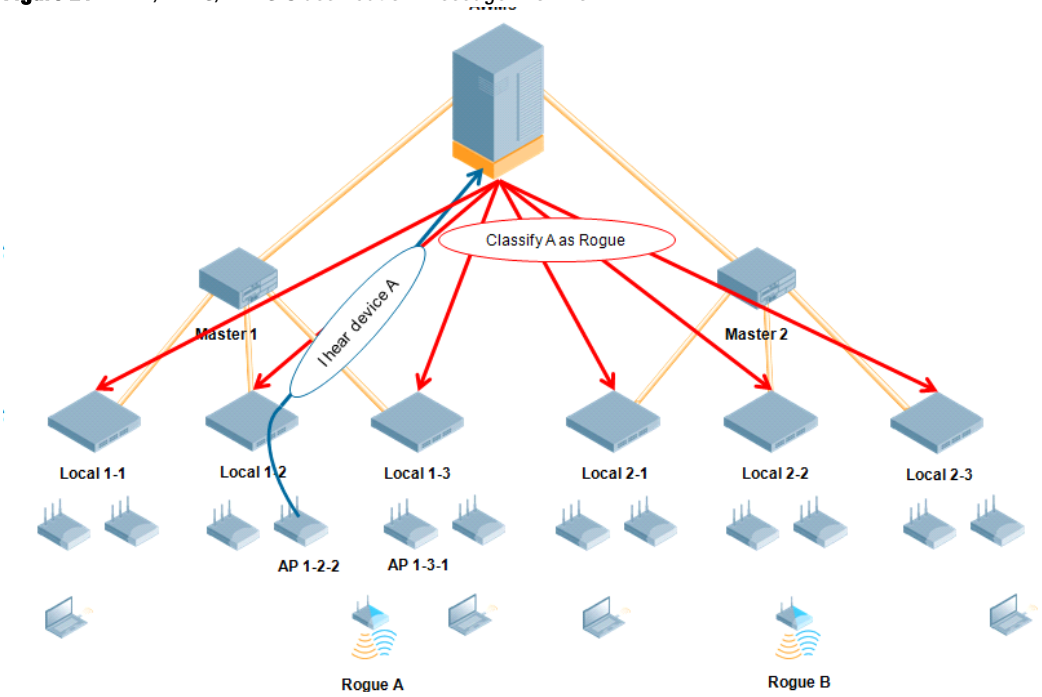
Data Elements	Controller/Thin AP					
	SNMP MIB	SNMP Traps	AMON	CLI/SSH	WMS Offload	RTLS
Configuration interface						
Device configuration/audit				X		
User and client interfaces						
Assoc/auth/roam	X	X				
Bandwidth	X					
Signal quality	X					X
Auth failures		X				
AP/radio interfaces						
CPU & memory utilization	<----------N/A---------->					
Bandwidth	X					
Transmit Power	X					
Channel utilization			X			
Noise floor	X					
Frame rates	X					
Error counters	X					
Channel summary				X		
ARM events		X				
Active interferers			X			
Active BSSIDs/SSIDs	X					
Security						
IDS events		X				
Neighbors/rogues	X				X	
Neighbor re-classification				X	X	
Client classification					X	
User de-auth				X		

Appendix C

WMS Offload Details

WMS Offload instructs the Master controller to stop correlating ARM, WIPS, and WIDS state information amongst its Local controllers, because AMP will assume this responsibility. Figure 24 depicts how Dell PowerConnect W-AirWave communicates state information with Local controllers.

Figure 24 *ARM/WIPS/WIDS Classification Message Workflow*



State Correlation Process

1. Dell PowerConnect W-Series AP hears rogue device A
2. Local controller 1-3 evaluates devices and does initial classification and sends a classification request to the AMP
3. AMP receives message and re-classifies the device if necessary and reflects this within AMP GUI and via SNMP traps, if configured
4. AMP sends a classification message back to all Local controllers managed by Master controller 1, (1-1, 1-2, and 1-3)
5. AMP sends a classification message back to all additional Local controllers managed by the Dell PowerConnect W-AirWave server. In this example all Local controllers under Master controller 2, (2-1, 2-2, and 2-3) would receive the classification messages.
6. If an administrative AMP user manually overrides the classification, then AMP will send a re-classification message to all applicable local controllers

7. AMP periodically polls each Local controller's MIB to ensure state parity with the AMP database. If the Local controller's device state does not comply with the AMP database, AMP will send a re-classification message to bring it back into compliance.

NOTE: The Rogue Detail page displays a BSSID table for each rogue that displays the desired classification and the classification on the device.

Benefits of using AMP as Master Device State Manager

- Ability to correlate state among multiple Master controllers. This will reduce delays in containing a rogue device or authorizing a valid device when devices roam across a large campus.
- Ability to correlate state of third party access points with ARM. This will ensure Dell PowerConnect W-Series infrastructure interoperates more efficiently in a mixed infrastructure environment.
- Ability to better classify devices based on AMP wire-line information not currently available in ArubaOS.
- AMP provides a near real-time event notification and classification of new devices entering air space.
- RAPIDS gains additional wire-line discovery data from Dell PowerConnect W-Series controllers.

Understand Band Steering's Impact on Location

Band steering can negatively impact location accuracy when testing in highly mobile environment. The biggest hurdle is scanning times in 5 GHz frequency.

Table 8 *Location accuracy impact*

Operating Frequency	Total Channels	Scanning Frequency	Scanning Time	Total Time One Pass
2.4 GHz	11 (US)	10 seconds	110 milliseconds	121.21 seconds
5 GHz	24 (US)	10 seconds	110 milliseconds	242.64 seconds

Leveraging RTLS to Increase Accuracy

This section provides instructions for integrating the AMP, Dell PowerConnect W-Series WLAN infrastructure and RTLS feed for more accurately locating wireless clients and Wi-Fi Tags.

Deployment Topology

Figure 25 *Typical Client Location*

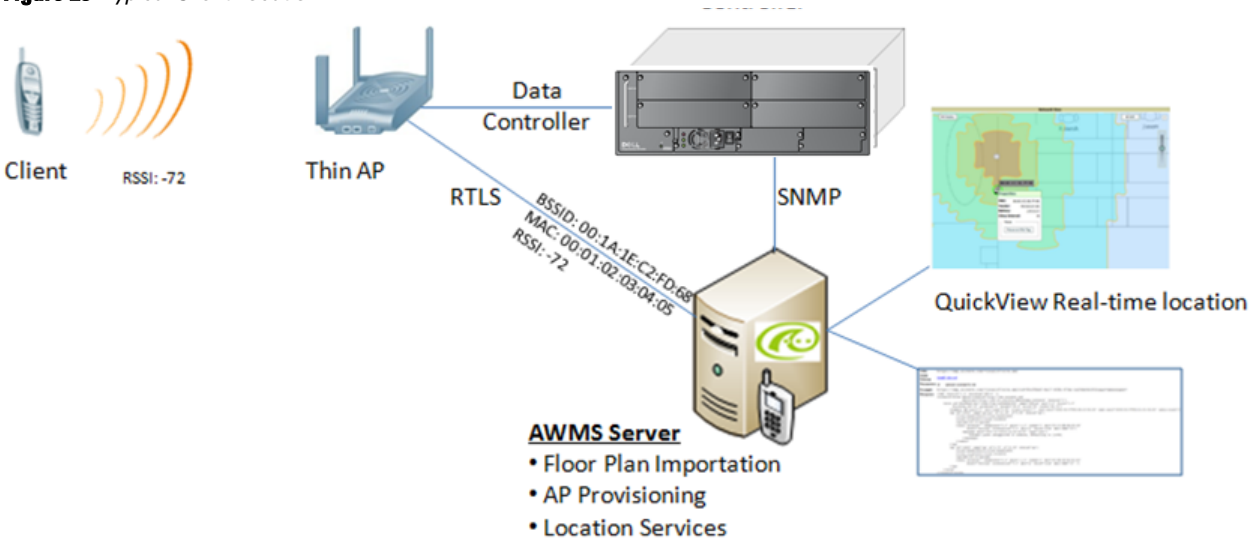
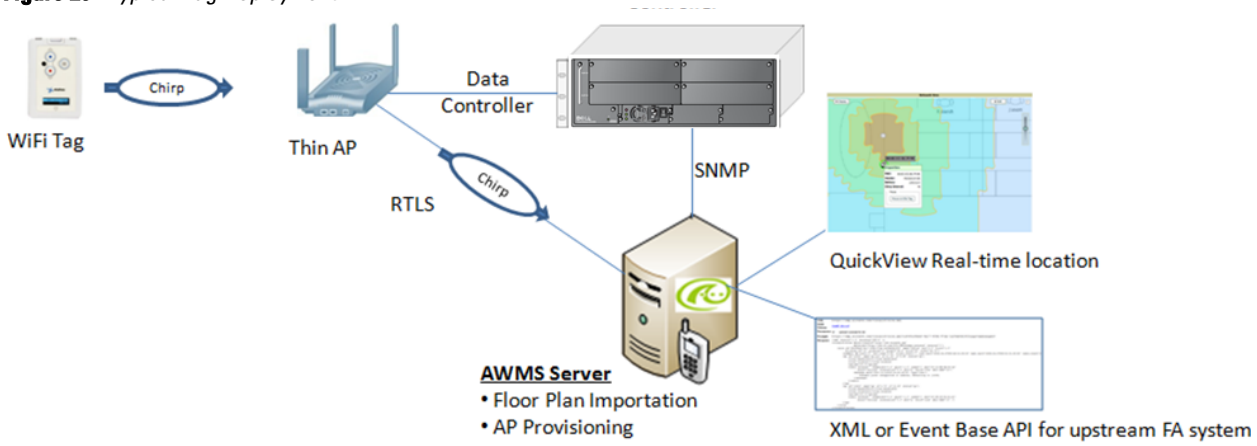


Figure 26 *Typical Tag Deployment*



Prerequisites

You will need the following information to monitor and manage your Dell PowerConnect W-Series infrastructure.

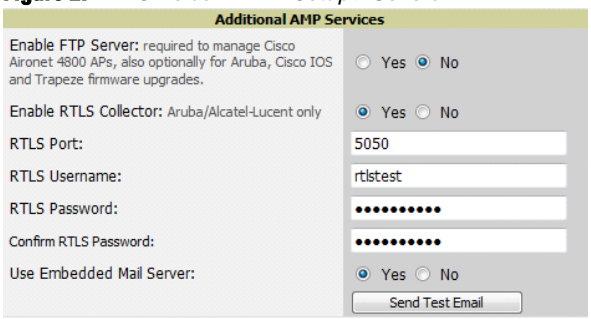
- Ensure AMP server is already monitoring Dell PowerConnect W-Series infrastructure
- Ensure WMS Offload process is complete
- Ensure firewall configuration for port 5050 (default port) supports bidirectional UDP communication between the AMP server's IP address and each access point's IP address

Enable RTLS service on the AMP server

To enable RTLS service on the AMP server, follow these steps:

1. Navigate to **AMP Setup > General** and locate the **AMP Additional Services** section
2. Select **Yes** to Enable RTLS Collector.
3. A new section will automatically appear with the following settings:
   - **RTLS Port** - match controller default is 5050
   - **RTLS Username** - match the SNMPv3 MMS username configured on controller
   - **RTLS Password** - match the SNMPv3 MMS password configured on controller

Figure 27 *RTLS Fields in AMP Setup > General*



4. Select **Save** at the bottom of the page.

Enable RTLS on Controller

NOTE: RTLS can only be enabled on the master controller and it will automatically propagate to all local controllers.

SSH into master controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # ap system-profile <PROFILE USED BY THIN APs>

(Controller-Name) (AP system profile default) # rtls-server ip-addr <IP OF AMP SERVER> port 5050
key <SNMPv3 MMS PASSWORD CONFIGURED ON CONTROLLER>

(Controller-Name) (AP system profile default) # write mem
```

To validate exit configuration mode:

```
(Controller-Name) # show ap monitor debug status ip-addr <IP ADDRESS OF ANY THIN ACCESS POINTS>
...
RTLS configuration
-------------------
Type       Server IP   Port Frequency Active
----       ---------   ---- --------- ------
MMS        10.51.2.45 5070 120
Aeroscout N/A         N/A   N/A
RTLS       10.51.2.45 5050 60         *
```

Troubleshooting RTLS

Ensure the RTLS service is running on your AMP server. SSH into your AMP server.

```
[root@AMPServer]# daemons | grep RTLS
root     17859 12809 0 10:35 ?        00:00:00 Daemon::RTLS
```

or

Navigate to **System > Status** and look for the RTLS service, as shown in

Figure 28 *RTLS System Status*

RFprotect Detection	OK	/var/log/sensor_rf_detection
Rogue Filter	OK	/var/log/rogue_filter
RTLS Collector	OK	/var/log/rtls
Sensor Discovery	OK	/var/log/sensor_discovery

Check the RTLS log file to ensure Tag chirps are making it to the AMP server. SSH into your AMP server.

```
[root@AMPServer]# logs

[root@AMPServer]# tail rtls

payload:
00147aaf01000020001a1ec02b32000000010000000137aae0100000c001a1ec02b320000001a1e82b32259
0006ddff02

1224534900.588245 - got 96 bytes from 10.51.1.39 on port 5050

Mon Oct 20 13:35:00 2008: 1224534900.588338 - got 96 bytes from 10.51.1.39 on port 5050

payload:
0014c9c90100003c001a1ec0507800000002000000013c9c70100000c001a1ec050780000000d54a7a28054
0001ddff020013c9c80100000c001a1ec050780000000cdb8ae9a9000006c4ff02

1224534900.588245 - got 96 bytes from 10.51.1.39 on port 5050

Mon Oct 20 13:35:00 2008: 1224534900.588338 - got 96 bytes from 10.51.1.39 on port 5050

payload:
0014c9c90100003c001a1ec0507800000002000000013c9c70100000c001a1ec050780000000d54a7a28054
0001ddff020013c9c80100000c001a1ec050780000000cdb8ae9a9000006c4ff02
```

Ensure chirps are published to Airbus by snooping on proper topics

```
[root@AMP server]# airbus_snoop rtls_tag_report
Snooping on rtls_tag_report:
Mon Oct 20 13:49:03 2008 (1224535743.54077)
%
    ap_mac => 00:1A:1E:C0:50:78
    battery => 0
    bssid => 00:1A:1E:85:07:80
    channel => 1
    data_rate => 2
    noise_floor => 85
    payload =>
    rssi => -64
    tag_mac => 00:14:7E:00:4C:E4
    timestamp => 303139810
    tx_power => 19
```

Verify external applications can see Wi-Fi Tag information by exercising the Tag XML API:

```
https://<AMP SERVER IP>/visualrf/rfid.xml
```

You should see the following XML output:

```
<visualrf:rfids version=1>
 <rfid battery-level=0 chirp-interval= radio-mac=00:14:7E:00:4C:E0
    vendor=>
    <radio phy=g xmit-dbm=10.0/>
    <discovering-radio ap=SC-MB-03-AP10 dBm=-91 id=811 index=1
      timestamp=2008-10-21T12:23:30-04:00/>
    <discovering-radio ap=SC-MB-03-AP06 dBm=-81 id=769 index=1
      timestamp=2008-10-21T12:23:31-04:00/>
    <discovering-radio ap=SC-MB-01-AP06 dBm=-63 id=708 index=1
      timestamp=2008-10-21T12:23:31-04:00/>
    <discovering-radio ap=SC-MB-02-AP04 dBm=-88 id=806 index=1
    timestamp=2008-10-21T12:22:34-04:00/>
 </rfid>
 <rfid battery-level=0 chirp-interval= radio-mac=00:14:7E:00:4B:5C
    vendor=>
    <radio phy=g xmit-dbm=10.0/>
    <discovering-radio ap=SC-MB-03-AP06 dBm=-74 id=769 index=1
      timestamp=2008-10-21T12:23:20-04:00/>
    <discovering-radio ap=SC-MB-01-AP06 dBm=-58 id=708 index=1
      timestamp=2008-10-21T12:23:20-04:00/>
    <discovering-radio ap=SC-MB-03-AP02 dBm=-91 id=734 index=1
      timestamp=2008-10-21T12:23:20-04:00/>
 </rfid>
 <rfid battery-level=0 chirp-interval= radio-mac=00:14:7E:00:4D:06
    vendor=>
    <radio phy=g xmit-dbm=10.0/>
    <discovering-radio ap=SC-SB-GR-AP04 dBm=-91 id=837 index=1
      timestamp=2008-10-21T12:21:08-04:00/>
    <discovering-radio ap=SC-MB-03-AP06 dBm=-79 id=769 index=1
      timestamp=2008-10-21T12:22:08-04:00/>
    <discovering-radio ap=SC-MB-01-AP06 dBm=-59 id=708 index=1
      timestamp=2008-10-21T12:23:08-04:00/>
    <discovering-radio ap=SC-MB-02-AP04 dBm=-90 id=806 index=1
      timestamp=2008-10-21T12:22:08-04:00/>
 </rfid>
</visualrf:rfids>
```

Wi-Fi Tag Setup Guidelines

- Ensure that the tags can be heard by at least three (3) access points from any given location. The recommended is 4 for best results.
- Ensure that the tags chirp on all regulatory channels.